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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/536,696	11/08/2005	Arnaud Grisard	4590-410	2283

33308 7590 05/25/2010

LOWE HAUPTMAN HAM & BERNER, LLP
1700 DIAGONAL ROAD, SUITE 300
ALEXANDRIA, VA 22314

EXAMINER	
RIVERA, JOSHEL	
ART UNIT	PAPER NUMBER
1791	
MAIL DATE	DELIVERY MODE
05/25/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/536,696	GRISARD ET AL.	
	Examiner	Art Unit	
	JOSHEL RIVERA	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 February 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 May 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1, 2, 4, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al (US Patent 5,796,902).

3. With regards to claim 1, Bhat teaches a method of producing a non linear optical waveguide where the surface of the template is polished removing excess material and

leaving a planarized surface (column 7 lines 18 – 27) then a waveguide structure is epitaxially grown over the template surface (column 7 lines 55 – 56). Bhat fails to explicitly disclose determining the thickness of the upper part of the initial grating that has the structural imperfections and cleaning and checking the polished surface.

4. It would have been obvious to one of ordinary skills in the art at the time of the invention to first determine the thickness of the part where the structural imperfections are located before polishing the surface and checking and cleaning the polished surface before epitaxially growing a waveguide structure on the polished surface in Bhat's producing method. The rationale being that Bhat states that the polishing step is done to remove enough material to expose the pads and the plugs remaining in the apertures (column 7 lines 23 – 26). One of ordinary skills would first determine the amount of excess material in order to avoid damaging the template structure during the polishing step. Additionally, since Bhat states that one would remove enough material to expose the pads and plugs, it would indicate that checking the polished surface is intrinsic in order to determine if the pads are exposed or not. Finally cleaning the surface after polishing would be intrinsic in order to remove contaminants or residue from the polishing process.

5. Bhat fails to explicitly disclose that the method produces a thick nonlinear optical grating with a thickness of several hundred microns. It would have been obvious to one of ordinary skills in the art at the time of the invention to have used Bhat's method for producing a thick nonlinear optical gratin with a thickness of several hundred microns. The rationale being that, Since Bhat teaches that the method can be apply to create

gratings of several hundreds of nanometers (column 15 lines 47 – 56) as well as several microns (column 7 lines 55 – 67), it suggests that the process described by Bhat can be scaled up. The product made by Bhat is the same as the product made by the Applicant and both methods of productions are similar but at a different size scale. Scaling up a process does not have patentable weight as per In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955) (Claims directed to a lumber package "of appreciable size and weight requiring handling by a lift truck" where held unpatentable over prior art lumber packages which could be lifted by hand because limitations relating to the size of the package were not sufficient to patentably distinguish over the prior art.); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976) ("mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled." 531 F.2d at 1053, 189 USPQ at 148.). In Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

6. With regards to claim 2, the teachings of Bhat are presented above. Bhat fails to explicitly disclose the use of optical display devices in order to determine the thickness of the surface having the imperfections.

7. It would have been obvious to one of ordinary skills in the art at the time of the invention to use optical display devices in order to determine the thickness of the part that has imperfections in Bhat's manufacturing process. The rationale being that, since Bhat states that the polishing step is done to remove enough material to expose the pads and the plugs remaining in the apertures (column 7 lines 23 – 26), in order to view the surface and to view the excess material at a nano or micro scale as this process is being performed one would intrinsically need an optical display device since the human eye is not capable of seeing at this scale.

8. With regards to claim 4, the teachings of Bhat are presented above. Additionally Bhat illustrates in Figure 7 that the initial nonlinear grating (items 62 and 63) is supported by a substrate (item 42) of Gallium Arsenide with a lower surface (a solid line at the bottom of the figure) and a plane upper face coinciding with the first face of the of the initial nonlinear optical grating (dotted line), which is capable of regrowth due to epitaxial process (column 7 lines 6 – 17), indicating that this substrate is a seed substrate.

9. With regards to claim 11, the teachings of Bhat are presented above. Additionally Bhat explicitly states that the production method is for producing waveguide structures (Abstract, column 7 lines 55 – 67) and teaches embodiments where one layer has a higher refractive index than a lower layer (column 8 lines 21 – 45).

10. With regards to claim 12, the teachings of Bhat are presented above. Bhat explicitly states that the waveguide layers are epitaxially grown by OMCVD (column 7 lines 55 – 56).

11. Claims 3, 8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al (US Patent 5,796,902) as applied to claims 1, 2, 4, 11 and 12 above, and further in view of Becouarn et al ("Second harmonic generation of CO_2 laser using thick quasi-phase-matched GaAs layer grown by hydride vapour phase epitaxy" Electronics Letters, IEE Stevenage, GB vol. 34, No.25, December 10, 1998 pages 2409-2410).

12. With regards to claims 3 and 13, the teachings of Bhat are presented above. Bhat fails to disclose that the thickness of the initial optical grating is at least 50 microns.

13. Becouarn teaches growing an initial optical grating with a thickness of 100 microns (page 2409 second column first paragraph) used for nonlinear frequency conversion (page 2409 first column first paragraph).

14. It would have been obvious to one of ordinary skills in the art at the time of the invention to have used an initial optical grating with a thickness greater than 50 microns, as suggested by Becouarn, in Bhat's manufacturing method. The rationale being that, as stated by Becouarn, plates with thickness approximately 100 microns can be easily handled without any significant risk of damage (page 2409 first column first paragraph).

15. With regards to claim 8, the teachings of Bhat and Becouarn are presented above. Bhat fails to explicitly disclose that the initial nonlinear optical grating is obtained by HVPE.

16. Becouarn teaches using HVPE as the method to grown nonlinear optical grating (page 2409 Abstract).

17. It would have been obvious to one of ordinary skills in the art at the time of the invention to have used HVPE, as suggested by Becouarn, in order to produce the initial nonlinear optical grating in Bhat's manufacturing method. The rationale being that, as stated by Becouarn, other types of epitaxial processes, like MOCVD or MBE, have a low deposition rate (page 2409 first column first paragraph).

18. Claims 5, 7, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al (US Patent 5,796,902) as applied to claims 1, 2, 4, 11 and 12 above, and further in view of Lallier et al ("Efficient Second-Harmonic Generation of a CO_2 Laser with a Quasi-Phase-Matched GaAs Crystal", Optics Letters, Vol. 23, No. 19, PP. 1511-1513, 1998).

19. With regards to claim 5, the teachings of Bhat are presented above. Bhat teaches that the seed substrate (Figures 6 and 7 item 42) comprises a crystalline material with a first crystal orientation (Figure 6) and on the upper face of the seed substrate it has a thin structure with a crystalline material having an opposite crystal orientation to the seed substrate (Figure 6). Bhat fails to explicitly disclose that the thin

structure was formed from a precursor grating of parallel bands of the same crystalline material.

20. Lallier teaches forming a structure by stacking parallel bands of the same crystalline material, identical to the one used by Bhat, in alternating crystal orientation (page 1511 first column last paragraph, second column first paragraph).

21. It would have been obvious to one of ordinary skills in the art at the time of the invention to have used the same crystalline material but with opposite crystal orientation, as suggested by Lallier, in order to produce a thin substructure for Bhat's manufacturing method. The rationale being that, as stated by Lallier, the material, Gallium Arsenide, has properties that are favorable with those of usual IR nonlinear materials but is not birefringent which one could take advantage of these properties for quasi-phase-matching techniques (page 1511 first column last paragraph).

22. With regards to claim 7, the teachings of Bhat and Lallier are presented above. Bhat fails to explicitly disclose polishing the lower face of the seed substrate and bonding it to a plane support.

23. Lallier teaches polishing the lower faces of the monolithic structure and bonding the monolithic structure to a graphite support in order to compress the blades (page 1511 second column first and second paragraphs).

24. It would have been obvious to one of ordinary skills in the art at the time of the invention to polish the lower face of the seed substrate and bond it to a support plane, as suggested by Lallier, in Bhat's manufacturing method. The rationale for polishing the

surface would have been that, as stated by Lallier, stress and temperature can significantly damage the surface of the crystal that is in contact with the graphite support (page 1511 second column second paragraph). The rationale to use a graphite support would have been, as stated by Lallier, it would facilitate the compression of the crystal blades in order to bond the parallel blades (page 1511 second column first paragraph).

25. With regards to claim 9, the teachings of Bhat and Lallier are presented above. Bhat teaches a first substep of producing a stack of crystalline plates having parallel plane faces and of alternating crystal orientation (Figure 3 it can be seen the plates with the same orientation but on Figure 4 once assemble the final structure the orientations of the plates alternate between each other) and a second substep of assembling said crystalline plates so as to obtain a single monolithic assembly (Figure 4). Bhat fails to explicitly disclose that the stack of crystalline plates is made of the same material.

26. Lallier teaches forming a structure by stacking parallel bands of the same crystalline material in alternating crystal orientation (page 1511 first column last paragraph, second column first paragraph).

27. It would have been obvious to one of ordinary skills in the art at the time of the invention to have used the same crystalline material but with opposite crystal orientation, as suggested by Lallier, in order to produce a thin substructure for Bhat's manufacturing method. The rationale being that, as stated by Lallier, the material, Gallium Arsenide, has properties that are favorable with those of usual IR nonlinear

materials but is not birefringent which one could take advantage of these properties for quasi-phase-matching techniques (page 1511 first column last paragraph).

28. With regards to claim 10, the teachings of Bhat and Lallier are presented above. Bhat fails to explicitly disclose polishing the lower face of the monolithic stack and bonding it to a plane support.

29. Lallier teaches polishing the lower faces of the monolithic structure and bonding the monolithic structure to a graphite support in order to compress the blades (page 1511 second column first and second paragraphs).

30. It would have been obvious to one of ordinary skills in the art at the time of the invention to polish the lower face of the seed substrate and bond it to a support plane, as suggested by Lallier, in Bhat's manufacturing method. The rationale for polishing the surface would have been that, as stated by Lallier, stress and temperature can significantly damage the surface of the crystal that is in contact with the graphite support (page 1511 second column second paragraph). The rationale to use a graphite support would have been, as stated by Lallier, it would facilitate the compression of the crystal blades in order to bond the parallel blades (page 1511 second column first paragraph).

31. Claim 6 rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al (US Patent 5,796,902) and Lallier et al ("Efficient Second-Harmonic Generation of a CO_2 Laser with a Quasi-Phase-Matched GaAs Crystal", Optics Letters, Vol. 23, No. 19, PP. 1511-1513, 1998). as applied to claims 5, 7, 9 and 10 above, and further in view of

Becouarn et al ("Second harmonic generation of CO_2 laser using thick quasi-phase-matched GaAs layer grown by hydride vapour phase epitaxy" Electronics Letters, IEE Stevenage, GB vol. 34, No.25, December 10, 1998 pages 2409-2410).

32. With regards to claim 6, the teachings of Bhat and Lallier are presented above. Bhat and Lallier fail to explicitly disclose that the seed substrate has a thickness of at least 300 microns.

33. Becouarn teaches using a seed substrate of a material identical to the one used by Bhat and Lallier with a thickness of 400 microns (page 2409 second column first paragraph). It would have been obvious to one of ordinary skills in the art at the time of the invention to have used a seed substrate with a thickness greater than 300 microns, as suggested by Becouarn, in Lallier and Bhat's manufacturing method. The rationale being that, as stated by Becouarn, the fundamental wave transmission for nonlinear frequency conversion at the seed substrate is comparable to the average transmission in the grown layer when the displacement is of 400 microns (page 2409 second column second paragraph).

Response to Arguments

34. Applicant's arguments filed February 19, 2010 have been fully considered but they are not persuasive.

35. Regarding that Bhat teaches a process for structures limited to several microns the argument is not persuasive. Since Bhat teaches that the method can be apply to

create gratings of several hundreds of nanometers (column 15 lines 47 – 56) as well as several microns (column 7 lines 55 – 67), it suggests that the process described by Bhat can be scaled up. The product made by Bhat is the same as the product made by the Applicant and both methods of productions are similar but at a different size scale. Scaling up a process does not have patentable weight as per In re Rose , 220 F.2d 459, 105 USPQ 237 (CCPA 1955) (Claims directed to a lumber package "of appreciable size and weight requiring handling by a lift truck" where held unpatentable over prior art lumber packages which could be lifted by hand because limitations relating to the size of the package were not sufficient to patentably distinguish over the prior art.); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976) ("mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled." 531 F.2d at 1053, 189 USPQ at 148.). In Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

36. Regarding the argument that Bhat discloses a method of producing a good template before the epitaxial growth while the applicant produces the template after the epitaxial growth is not persuasive. Claim 1 recites determining the thickness of the initial

thick nonlinear optical grating, polishing the surface of the initial optical grating, cleaning and the performing an epitaxial growth. There is no mention in the claim how the initial thick nonlinear optical grating is provided. Additionally Bhat first epitaxially forms the initial optical grating used as a template (column 7 lines 28 – 49), then the surface of the template is polished removing excess material and leaving a planarized surface (column 7 lines 18 – 27) and then a waveguide structure is epitaxially grown over the template surface (column 7 lines 55 – 56). The Examiner fails to see the difference between Applicant's method and the method disclosed by Bhat.

37. Regarding Applicant's argument that determining the thickness in Bhat is not necessary because there are no structural imperfections when grating have a small thickness, the Examiner disagrees. Bhat is polishing the surface of the initial optical grating (column 7 lines 18 – 27). If there are no structural imperfections because of the small thickness then there would be no need to polish the surface to remove excess material and leaving a planarized surface as stated by Bhat. Also the small thickness pointed by the Applicant that Bhat teaches is the second nonlinear optical grating formed on top of the template while claim 1 recites determining the thickness of the initial nonlinear optical grating, being the initial optical grating the template in Bhat that requires polishing, which before etching and polishing possesses a thickness greater than 40 nm (column 5 lines 54 – 67, column 6 lines 1 – 12).

38. Regarding the objection and rejection under 35 USC 112 second paragraph of the claims, based on the amendments, the rejection and objections are withdrawn.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSHEL RIVERA whose telephone number is (571) 270-7655. The examiner can normally be reached on Monday - Thursday 7:30am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Katarzyna Wyrozebski can be reached on (571) 272-1127. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. R./
Examiner, Art Unit 1791

/KAT WYROZEBSKI/
Supervisory Patent Examiner, Art Unit 1791